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AUTHOR	Cheng, Chin-Chuan
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ABSTRACT

This article describes the computer-based facilities developed by the Computer-Based Education Research Laboratory at the University of Illinois. The computerized system, known as PLATO (Programmed Logic for Automated Teaching Operation), utilizes a CDC 1604 computer. The Chinese course objectives and PLATO programing procedures are described in detail. (RL)

COMPUTER-BASED CHINESE TEACHING PROGRAM AT ILLINOIS*

Chin-Chuan Cheng

University of Illinois, Urbana-Champaign

Before I discuss the computer-based Chinese teaching program, I will give a brief description of the computer-based instructional facilities developed by the Computer-based Education Research Laboratory of the University of Illinois. PLATO, short for Programmed Logic for Automated Teaching Operation, is not just a laboratory curiosity. Since its inception in 1960, it has actually been used to teach courses in at least 20 fields and foreign languages including French, German, Latin, Russian, Spanish, and Chinese. In total, there have been over 100,000 student contact hours of use in course work at various levels.

The current system in full operation, PLATO III, consists of 20 student stations connected to a CDC 1604 computer. Each student station is equipped with an electronic keyset for communicating with the computer and a television screen for viewing visual display. PLATO III has a random-access slide selector and an electronic blackboard on which diagrams and symbols can be plotted. The images on the electronic blackboard can be superimposed on slides displayed on the student's television.

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A more advanced system, PLATO IV, is now being developed and is currently in the early stages of operation. The processor of this system is a CDC 6400 computer. The student terminal consists of a keyset and a plasma display panel. The display panel is an 8 1/2 inch square glass panel containing an array of 512 x 512 dot matrix display with inherent memory. Any dot can be selectively lighted. The panel is transparent, allowing the superimposition of optically projected images produced by a slide selector, which is also part of the terminal. The features of the panel include a writing speed of 180 letters per second and a drawing speed in excess of 600 inches per second (Stifle 1972). A high-speed random access audio hook-up has been developed. In addition, a touch panel, which allows the student to select points or draw lines on the display panel with his finger is under development. At the moment, there are about 70 terminals in use. It is hoped to have several thousand terminals located within an approximate 150-mile radius of Urbana-Champaign in a few years. The estimated cost per user will be fifty cents per hour.

The PLATO software system has the ability to interact with the student. It can pose questions and then immediately tell the student whether his response is correct or incorrect; and if the response is incorrect, it can tell him what word contained the error and what type of the error (spelling or otherwise) was made. Computer responses are given within a fraction of a second. Moreover, the computer "remembers" the student's responses and can force him to review areas of difficulty by giving him additional drills in those areas.

Besides making judgments and giving interactive responses to the student, the PLATO software system has the ability to collect data on a student's responses at every step of the program and to make reports to the instructor. This allows the instructor to identify the student's weaknesses.

As reported in Alpert and Bitzer (1970), subjective evaluation of PLATO by both students and teachers has been unusually positive due to the following features of the system: (1) the interactive nature of this instructional medium absorbs the attention and encourages the total involvements of students; (2) with the computer's individual attention the student may proceed at his own pace; (3) information is fed back and then applied in both the learning and teaching processes; (4) lesson materials may be written or edited in response to the particular needs of students. The last point needs to be qualified, however. As reported by lesson authors, it takes about 25 hours to develop a 50-minute lesson.

The development, including the past and present activities and future projection, of the computer-based Chinese instruction project at the University of Illinois can be divided into experimental, supplementary, and integral stages. Here I will discuss the work of the experimental stage in detail; the supplementary and integral stages are things of the future and will be mentioned only very briefly.

When thinking about teaching Chinese on a computer the question which typically comes to mind is whether the computer is able to write in Chinese. Our experimental stage began in 1970 when we started to

experiment with plotting Chinese characters. Our efforts over the summer produced several programs devoted to instruction in the stroke order of characters. We plotted 150 characters and experimented with translation drills from English to Chinese as well as from Chinese to English. Because of a lack of funds progress was slow during the 1970-71 academic year. In this period work was devoted mainly to further experiments on translation drills and to refining the Chinese characters already plotted.

In the summer of 1971 a tape of line coordinates of 6,800 Chinese characters was made available. The characters were designed by Kuno's group at Harvard University. The work of the summer was devoted to selecting 2,000 Chinese characters from this tape, developing a program to convert these line coordinates to a system compatible with the PLATO system and storing these characters for ready recall. The 1971-72 academic year was devoted to further refinement of the stroke order lessons, constructing reading comprehension lessons, and developing five programs for the introduction of the Chinese sound system. During the summer of 1972, these materials were tested with the help of a number of beginning students attending the summer language program.

Through a timing feature of the software, the stroke order lessons allow the student to see a character composed stroke by stroke in the correct order. Then, by pressing a designated key the student controls the appearance of individual strokes to allow him to imitate them. On the appearance of the final stroke in each character the Pinyin spelling and meaning of the character are given. In the future, with the touch panel in operation, the student will be able to reproduce the character on the screen and have it judged by the computer.

The reading comprehension lessons consist of a passage in Chinese for the student to read. A screen page consists of about 100 characters. By pressing a designated key the student can go to the vocabulary to look up the meaning of any characters he does not know. After reading the passage the student is required to take a quiz testing his understanding of the passage. The pace at which the passage is read, the number of times read, the number of times the vocabulary is consulted all can appear in the daily record; this allows for diagnosis of student weaknesses and weaknesses in the program itself.

The pronunciation lessons are designed to "tune" the student's ear. Each of the five lessons begins with a narrative portion describing the sounds. The description is both seen on the display and heard on pre-recorded tape. The narrative section is then followed by a series of fifty drills in which the student listens to the sounds and transcribes them by use of the keyset using Pinyin and numerals 1, 2, 3, 4, and 0 for first, second, third, fourth, and the neutral tone respectively. The computer evaluates every response, indicating errors and keeping a running score. The student can rewind the tape and try again as many times as necessary.

It is rather unfortunate that over the past two years we had only a part-time teaching assistant working on the project. With the beginning of the operation of PLATO IV this fall, the project has somehow fallen into my hands. Since PLATO III will be phased out in a few years, all new lessons are being written on PLATO IV. My first task was to re-examine the character coordinates developed at Harvard University.

In this system, each character is internally represented by pairs of coordinates, each corresponding to the beginning and end points of a straight line on a 16 x 16 grid. The constraint that all characters must be represented by straight lines on a 16 x 16 grid has not caused any difficulties in plotting any characters (Duncan, Mukaii, and Kuno 1969). Since strokes are given in straight lines, a slanting stroke usually consists of coordinates for two or more short straight lines. The plotted characters look extremely natural to the Chinese eye. The coordinates of lines which compose individual characters are supposed to be given according to a generally accepted stroke order. However, in the actual plotting, I noticed a great deal of characters presented with unconventional or incorrect stroke orders. I have written an on-line editing routine to inspect and change the stroke order; the process, including inspection, correction, and implementation, takes only a couple of minutes for each character.

Since romanization is used to communicate with the computer, the problem of homonyms inevitably arises. As is well known, any device to make homonyms distinct is either arbitrary or clumsy. Our solution at the University of Illinois is to show the homonyms in character form on the display panel at every occurrence of an ambiguous spelling and ask the student to identify the desired word with an ad hoc addition of a digit. The student needs only to remember the Pinyin spelling of the words. Since we are dealing with elementary language instruction, not text editing or dictionary compilation, the amount of homonyms in a lesson or group of lessons is never overwhelming.

It is hoped that the experimental stage will be concluded at the end of the academic year 1972-73. At the beginning of summer 1973 we should have enough lesson materials for first year Chinese. But it should be made clear that these PLATO IV lessons will only supplement classroom instruction. How long the supplementary stage of Chinese computer instruction at the University of Illinois will last depends largely on how soon we obtain financial supports to develop full programs to coorperate with the classroom activities. When that time comes the computer instruction will be an integral part of the Chinese teaching program.

During the early experimental stage, lessons were developed which utilize the interactive nature of the computer medium, and we have gained some experience in this area. At this point, it is important to seek more substantive changes in the Chinese instruction program in general, before planning further computer lessons. I feel the following two points are important.

The first point has to do with our textbooks. In 1966 C. K. Wu (1966) called upon us to incorperate the latest language developments in China into our Chinese teaching program. But even today, there has been little evidence of such incorperation. The most conspicuous delay in our effort is in teaching simplified characters. The reasons generally given for not teaching simplified characters at the beginning level are that once the original characters are mastered the conversion to simplified ones is an easy matter, and that most of our students will be reading materials printed in the original characters anyway. The

purpose of character simplification in China is to reduce the difficulty in learning and writing the characters; we seem to be teaching the difficult thing first. Moreover, I believe the learning of original characters on the basis of simplified characters is as easy or difficult as the other way around. The argument about research material is not relevant for first year students. The real reason for the delay perhaps has been the availability of textbooks. This is no longer a major problem. Elementary Chinese published by Shāngwù Yìnshūguǎn looks like a good textbook and is readily available.

The second point has to do with the pattern drills, which are now an intensive part of our language program. Pattern drills are useful in the formation of syntactic structures, but we must realize that facility in the drill does not automatically lead to fluency in actual communication. The weakness of the method lies in its failure to recognize semantics as an integral part of the study of language. We all have heard complaints from students that they know all the patterns but do not know which one to use to express an intention or idea. Obviously, the connection between the conception of ideas and the syntactic structures is lost in our emphasis on rapid fire drills of patterns. However, my interest in the comception structure is not identical to J. C. Hsiung's (1969) interest in finding the interrelation between cultural norms and linguistic patterns. His task is "to draw upon cultural anthropology, social psychology, semantics, and epistemology as well as linguistics for language analysis", perhaps a formidable task for a language teacher. I feel that more attention must be paid to teaching students the process in which intended meaning leads to a verbal

utterance.

These two points will be taken into consideration in planning for changes in our classroom instruction program as well as for developing computer lessons.

One last question is whether computer-based instruction systems are worth all the effort. One might wonder whether computer-based instruction will eventually go the way of the audio language laboratory, which also generated a great deal of excitement and hope some twenty years ago but has now almost become a haunted room for the students. With the rapid development of technology, the currently conceived instructional media and systems may look extremely simplistic in ten years. But I hope I have shown that the move from the audio laboratory to the computer laboratory is not "changing the water without changing the medicine".

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